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this. The area of the *chorion frondosum* is very small, not over one-fourth of the area of the under side of the placental disk. The portion of the chorion underlying the placental disk, but not united with it, belongs to the *chorion læve*, and its abortive villosities even extend over and are developed on its surface somewhat beyond the edge of the placental disk.

The cytoclasts spoken of above are many times the size of any of the rest of the cells found in the uterus, fœtus, or fœtal membranes, and they also possess very large nuclei. The processes of adjacent cytoclasts spoken of frequently join, and there is thus formed a sort of syncytium. This syncytial structure, if isolated, would form a ring composed of cytoclasts just at the edge of the placenta, and is especially developed at about the time the zonary band of mucous membrane around the fœtus is nearly absorbed.

These data furnish further proof that the primitive or ancestral type of placentation was a more diffuse one than in existing Rodents of the myomorph type, and throws some additional light on the manner in which a discoidal type of placentation has been derived from one which was zonary.—*J. A. Ryder.*

PSYCHOLOGY.

On Duration of Memory in Wasps.—In studying the psychology of insects, it is noteworthy that we have very little satisfactory evidence with regard to duration of memory. Belt's observation on leaf-cutting ants, which tends to show recollection of a locality for one year, is by no means conclusive, as the facts are as well, if not better explained by supposing that the ants accidentally stumbled upon the old vacant nest. Also with bees, the observations of both Stickney and Huber are inconclusive. Stickney's evidence on the subject, as given by Romanes,[1] is as follows:

"Stickney relates a case in which some bees took possession of a hollow place beneath a roof, and having been then removed into a hive, continued for several years to return and occupy the same hole with their successive swarms."

It would be hardly safe to conclude that bees have extended powers of memory from so indefinite an account as this.

Again we quote from Romanes:[2]

"Similarly Huber relates an observation of his own, showing the duration of memory in bees. One autumn he put some honey in a window, which the bees visited in large numbers. During the winter the honey was taken away and the shutters shut. When they were again opened in the spring, the bees returned, although there was no honey in the window."

The obvious criticism is that we have no evidence that the bees that came in the spring were identical with those that came in the preceding autumn, it being possible, and indeed probable, that they visited the window in the second case, as they did in the first, by accident.

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[1] Animal Intelligence, p. 154.

[2] L. c., p. 155.

The facts which we have already published with regard to the recollection of the properties of glass by hornets[1] suggest, but scarcely establish, a memory of ten or twelve days' duration. Sir John Lubbock's observations demonstrate that bees remember for at least one day a locality in which they have found honey, but we recall no experiment, not open to serious objections, that tends to prove for ants, bees, or wasps a duration of memory greater than twenty-four hours.

The small number of published facts on this subject led us to make an attempt, during the past summer, to obtain some definite data as to the duration of memory in wasps. With this end in view, on August 18, we took from a nest of *Vespa maculata* forty-three wasps, imprisoning them in a large wire cage, and feeding them with apples. We kept them until August 20. Unfortunately, all died but seven. We marked these by a cut on the right upper wing, and set them free at a distance of thirty yards from the nest. They flew in various directions.

On August 22 we took forty wasps from the nest. These we carefully protected from cold at night. We fed them on apples and apple-jelly. Owing, probably, to the better care they kept strong and energetic.

On August 25 we liberated seventeen, marked by a cut on the left upper wing, thirty-five yards from the nest. The majority of these flew towards the nest. A few settled on the ground.

On August 26 we liberated thirteen, with both upper wings cut, thirty-five yards from the nest. They seemed to be in fairly good condition, and flew in various directions, several of them settling near us on the ground.

On August 27 we took seventy wasps from the nest, and gave them every care and attention, intending to keep them out for five or six days. They died in such numbers, however, that on August 29 we took the survivors, eight in number, and, after marking them with a V cut on one wing, set them free at a distance of two hundred and sixteen yards from the nest. Most of these settled near by. A few flew towards the nest.

Having stopped the entrance on the evening of August 29, on the morning of the 30th we poured a solution of cyanide of potassium into the nest, killing all the inhabitants. We then examined the dead wasps, one by one, to determinine how many of those that we had marked and liberated had returned to the nest. The result was as follows:

Of seven which had been retained fifty hours and were liberated thirty yards from the nest, we found five. Of seventeen which had been retained seventy-two hours and were liberated thirty-five yards from the nest, we found eleven. Of thirteen which had been retained ninety-six hours and were liberated thirty-five yards from the nest, we found six. Of eight which had been retained forty-nine hours and were liberated two hundred and sixteen yards from the nest, we found none. It thus appears that wasps remember the locality of their nests for ninety-six hours.

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[1] Proceedings of the Natural History Society of Wisconsin, pp. 121–22.

We had hoped to collect a much larger store of facts upon this subject, but were prevented from doing so by the difficulty of keeping the wasps alive after we had taken them from the nest, and by a lack of material to work upon. We were able to find only one wasp-nest during the entire summer, although in the summer of the year before we had found thirty-three nests in the same neighborhood.

Our strictures upon the observations of others may seem hypercritical, but when it is remembered that the only warrant for making any inference whatever is based upon the supposition that a similarity in the actions of insects to those of man, under a given set of circumstances, is the result of a similarity in their mental processes, it will seem scarcely possible to be too guarded in drawing conclusions.—*G. W. and E. G. Peckham.*

MICROSCOPY.[1]

Microtechnical Notes by Dr. Paul Mayer.—After describing the new water-bath and its accessories, Dr. Mayer proceeds to give the latest improvements in the methods employed at the Naples Zoological Station:

1. *The Section-Smoother, or Planisher.*[2]—The rod of the schnittstrecker, or planisher, as I shall call it, is not large enough to prevent very large sections from rolling a little. The defect is easily remedied by following the example of Vosmaer, who cuts off strips of the gelatin plates used by lithographers for tracing, and fastens them to the under side of the rod with very soft paraffine. In this manner the rod can readily be enlarged to any desired extent; and the transparency of the gelatin makes it possible to follow the sections as they pass under the rod.

2. *Section-Fixatives.*—Of the three fixatives now in general use,—shellac, collodion, and albumen,—shellac is considered the

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[1] Edited by C. O. Whitman, Ph.D., Milwaukee, Wisconsin.

[2] "Schnittstrecker" has been variously translated "section-smoother," "section-stretcher," "section-flattener," etc. Perhaps the German name has been poorly chosen; at all events, our renderings of it are decidedly unsatisfactory names. The instrument is designed to prevent sections from curling; in other words, *to keep them plane*, or flat. The word *planisher*, taken in a strictly etymological sense, expresses the idea precisely enough, is both simple and intelligible. I venture, therefore, to propose it as a substitute for the awkward and clumsy compounds hitherto employed.